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GRASS ITCH (ACARO-DERMATITIS URTICARIOIDES)
A STUDY OF A NEW DISEASE IN THIS COUNTRY

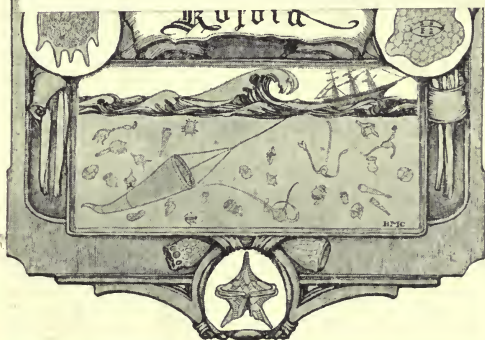
BY JAY FRANK SCHAMBERG, M. D.

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To Dr. David Riesman
with the warm regards of
his friend

Jay F. Chamberlayne

6.15.10



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GRAIN ITCH (ACARO-DERMATITIS URTICARIOIDES):
A STUDY OF A NEW DISEASE IN THIS COUNTRY.

BY JAY FRANK SCHAMBERG, M. D., Philadelphia.

I N the late spring of 1901, there appeared in Philadelphia and its vicinity an unfamiliar eruptive disease occurring chiefly in household epidemics, which attracted the attention of the various skin specialists of the city. Having had an opportunity of studying about a dozen of these cases, I published in the *Philadelphia Medical Journal*, July 6, 1901, several photographs of the disease and a brief description under the title: "An Epidemic of a Peculiar and Unfamiliar Disease of the Skin." Since 1901, cases of the same character have been encountered each year in Philadelphia, usually between the months of May and the beginning of October. The cause of the disease remained obscure and undetermined despite careful interrogations designed to ascertain the cause of the affection and the explanation of the household epidemicity.

In the spring and summer of 1909, this peculiar eruptive disease became quite prevalent in Philadelphia and neighboring towns. An outbreak among twenty sailors upon a private yacht docked in the Delaware River attracted the attention of both the city and the federal health authorities. The Surgeon-General of the United States Public Health and Marine Hospital Service delegated Dr. Joseph Goldberger, Passed Assistant Surgeon, to proceed to Philadelphia to make an investigation of the disease. Being already engaged in a semi-official study of the outbreak myself, Dr. Goldberger and I concluded to continue the inquiry jointly.*

* The result of this investigation was published by Drs. Goldberger and Schamberg in a preliminary report entitled "Epidemic of an Urticarioid Dermatitis due to a Small Mite (*Pediculoides Ventricosus*) in the Straw of Mattresses. *Public Health Reports*, U. S. Public Health and Marine Hospital Service, xxiv, No. 28, July 9, 1909.

After carefully examining the twenty sailors who had been sent to a hospital, we visited the yacht whence they came and made a searching examination of the conditions on board. Our attention was directed to the fact that a number of new straw mattresses had been received and that the disease was confined to those who had slept upon these mattresses or had placed their clothes upon them. Eleven officers and members of the crew who did not sleep upon the new mattresses remained entirely free of the disease.

At about the same period information was received concerning a similar eruptive disease prevailing among the sailors of four other boats, plying along the Delaware River. Investigation disclosed the fact that these boats had also received new straw mattresses, and, furthermore, that only those were attacked who slept upon the mattresses or otherwise came in contact with them.

In addition to these cases among sailors, we examined or received authentic information concerning seventy other cases of this disease occurring in twenty different households in Philadelphia and its vicinity.

In practically every instance we were enabled to determine that the patient had either recently slept upon a new straw mattress or had freely handled the same. Where only one person in a household was affected, it was found that he was the only one to occupy a bed supplied with a new straw mattress. We were able to trace all of the incriminated mattresses to four leading mattress manufacturers.

Careful investigation warranted us in excluding from consideration the ticking of the mattresses and the jute or cotton topping contained therein. The cause of the disease was, therefore, circumscribed to the straw. Repeated inquiries elicited the information that all of the manufacturers had received at the time the disease-producing mattresses were made up, wheat-straw from a dealer in Salem County, in southern New Jersey. One manufacturer had used straw from this source exclusively in the infested mattresses.

FINDING OF A PARASITE. Dr. Goldberger and the writer sifted the straw from a mattress through the meshes of a fine flour-sieve upon a large plate glass over white paper. Close scrutiny of the siftings under strong electric illumination soon detected some slight motion. The moving particles were touched with a needle moistened in glycerine and transferred to a glass slide. Search with

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the microscope disclosed the presence of a mite of very minute dimensions. This mite was identified for us by Mr. Nathan Banks, expert in acarina of the United States Bureau of Entomology, as very close to, if not identical with the *Pediculoides ventricosus*.

In order to demonstrate experimentally the ætiological relationship of the suspected straw mattresses, Dr. Goldberger exposed his bared left arm and shoulder for one hour between two mattresses. At the end of about sixteen hours, a number of characteristic lesions appeared upon the arm, shoulder, and chest. Later, three volunteers slept upon the mattresses, and each one developed the eruption at the end of about the same period.

Dr. Goldberger later took some of the sifted straw, divided it into two portions and placed it in two clean Petri glass dishes. One of these was applied for one hour to the left axilla of a volunteer. At the end of sixteen to seventeen hours, the characteristic eruption was present in the area of the left axilla to which the Petri dish of straw siftings had been applied.

The second portion of the straw siftings in a Petri dish was exposed to the vapor of chloroform under a bell jar with a view to killing any insect or acarina that might be present. These siftings were then applied to the right axilla of the same volunteer to whose left axilla the untreated siftings had been applied. The chloroform evidently destroyed in the siftings the agent that was producing the eruption, for no lesions appeared after the application of the chloroformized siftings.

Dr. Goldberger further fished out of some straw siftings five minute mites, and, placing them in a clean watch crystal, applied the crystal to the axilla of another volunteer. At the end of about sixteen hours following this application, five of the characteristic lesions appeared on the area to which the mites had been applied.

ERUPTION. The disease is characterized by an eruption consisting of wheals, many of which exhibit at their summits a central pin-point-sized vesicle. This is the peculiar lesion of the disease, and is so characteristic as to immediately suggest this affection. The contents of the vesicle are clear but for a brief period of time, and then become lactescent or distinctly puriform, constituting a well-marked pustule. Instead of frank wheals, the efflorescence may consist of barely elevated, erythemato-urticarial spots or papulo-urticarial lesions. The latter are œdematous in character, but have

the size and shape of papules. The lesions generally vary in size from a lentil to a finger-nail, and are rounded, oval, or irregular in shape. They are œdematous like the wheals of ordinary urticaria and are not infrequently elevated 1 to 2 mm. above the level of the skin. The color is usually a warm rose tint; only rarely do the lesions exhibit the pinkish-white anæmic area seen in ordinary "hives." The central vesicle or pustule is usually minute, not exceeding in diameter 0.5 mm. ; in many cases it is pin-head in size (about 2 mm.); exceptionally the vesicle or pustule may reach a diameter of 3 mm. In such cases, the large vesicles situated upon an erythemato-urticarial base present a strong resemblance to the lesions of chicken-pox. In many patients the tops of the lesions are so excoriated by scratching that no vesicles are seen; instead the wheals are surmounted by punctiform, dark red blood crusts.

The eruption varies in extent in different subjects; usually it is profuse, involving the neck, chest, abdomen, and back, and in a lesser degree the arms and legs. The greatest number of lesions is observed upon the trunk. The face is often free, although at times scattered lesions are present. The hands and feet are nearly always exempt. The extent of the eruption and the size of the individual lesions are apt to bear an inverse relation to each other. In the most profuse eruptions, 10,000 or more lesions may be present.

In rare instances, the eruption may undergo modification and take on the characteristics of the macular type of erythema multiforme. I noted this especially in the sailor patient shown in figure 6. The eruption on the face in this man was profuse and there was an erythema involving both of the lower eyelids. In another patient there was, in addition to the usual eruption, a partial scarlatinoid rash involving the anterior and lateral surfaces of the chest. This patient had fever, nausea, chilliness, and vomiting.

There are, therefore, three varieties of the eruption: in the order of their frequency they are—(1) urticaria-vesiculo-pustulosa type, (2) varicelloid type with large central vesicle or pustule, and (3) erythema multiforme type.

The eruption is usually accompanied by the most intolerable itching. This is worse at night and seriously interferes with sleep. The itching leads to violent scratching with the consequent production of excoriations and blood crusts, and at times pyogenic infection of the skin.

SYSTEMIC SYMPTOMS. During the early days of the attack the patient may experience chilliness and in some cases nausea and even vomiting. Mild rigors may recur throughout the course of the next few days. The temperature may be elevated from 100° F. to 102° F., or higher, with corresponding acceleration of the pulse rate; this pyrexia may continue for several days. It is, however, a very variable symptom and is often lacking. Some patients, although afebrile, complain of malaise and anorexia; others do not admit being ill at all. Indeed, even the patients with some elevation of temperature are not inclined to seek their beds. There is at times a moderate enlargement of the superficial lymphatic glands.

BLOOD EXAMINATIONS. The twenty sailors previously referred to were treated in the Marine Hospital Wards of St. Agnes Hospital. The resident pathologist of the institution, Dr. John Albert Kolmer, made, at my suggestion, careful examinations of the blood. Dr. Kolmer's report is herewith subjoined :

BLOOD EXAMINATIONS.*

TABLE I. JUNE 8, 1909.

NUMBER	LEUCOCYTES	LYMPHOCYTES		TRANSITIONALS	POLYMONUCLEARS	EOSINOPHILES	MAST CELLS	DAY OF DISEASE	EXTENT OF ERUPTION
		SMALL	LARGE						
1.	7,040	27	11.5	2.5	57.5	7.5	0	4th day	Moderate.
2.	10,400	16.15	10	1.15	69.22	3.13	.34	15th day	Moderate.
3.	10,160	24.8	4.8	.4	68	2	0	6th day	Moderate.
4.	7,800	24	11.11	.55	55	9.33	0	15th day	Scant.
5.	7,100	23.8	11.9	2.38	54.35	7.14	.5	5th day	Scant.
6.	10,600	25	3.5	1	64.5	6	0	4th day	Profuse. [type.
7.	10,000	23	9	.5	62.5	5	0	6th day	Profuse, multiform erythema
8.	6,000	20	5.33	.88	71.11	2.22	.44	5th day	Moderate.
9.	6,700	23.8	11.9	.47	61	2.38	.47	6th day	Moderate.
10.	7,000	41.38	3.51	1.37	51.69	.68	1.37	7th day	Profuse.
11.	7,100	40	11	1	45	3	0		Moderately profuse.
12.	11,100	22	4.5	1	62.5	10	0	4th day	Profuse.
13.	9,900	37.5	7	1	62.5	2	0		Very profuse, recurrent.
14.	5,700	29.37	8.12	.62	55	6.25	.62		Profuse.
15.	8,300	14.01	7.91	.41	73	4.16	.41	5th day	Moderate.
16.	9,000	32.2	4.34	.43	54.34	7.82	.87	5th day	Profuse.
17.	10,000	44.44	9.61	1.92	38.59	5.44	0	5th day	Moderate.
18.	8,200	37.05	8.82	1.2	47.05	5.88	0	7th day	Moderate.
19.	6,300	30	10.5	1	50	2.5	0	6th day	Moderate.
20.	6,500	28.8	5.67	.56	59.65	5.67	0	6th day	Quite moderate.
<hr/>									
Avg.	8,245	27.71	7.95	1.01	58.12	4.9	.22		

* From Clinical Laboratory of St. Agnes Hospital.

BLOOD EXAMINATIONS.*

TABLE II. JUNE 12, 1909.

NUMBER	LEUCOCYTES	LYMPHOCYTES		TRANSITIONALS	POLYMONUCLEARS	EOSINOPHILES	MAST CELLS	SPECIAL CELLS
		SMALL	LARGE					
1....	7,000	28.2	13.63	.9	54.54	2.72	0	0
2....	8,600	20	7.59	.76	69.25	2.5	0	0
3....	8,000	30.64	9.37	.62	56.25	1.87	1.24	0
4....	10,000	25.63	8.54	.85	64.1	.87	0	0
5....	6,800	24.17	10.34	1.37	55.16	7.58	1.37	0
6....	8,800	35.66	8.66	4.66	46.66	4.66	0	0
7....	5,400	28.63	5.23	.47	64.28	2.38	0	0
8....	8,000	40.86	4.16	.83	51.66	1.66	.83	0
9....	8,000	31.79	1.76	.58	64.7	1.16	0	0
10....	6,700	38.46	3.16	.66	57.06	.66	0	0
11....	8,000	26.25	5.62	1.87	64.39	1.87	0	0
12....	8,000	21.82	10.45	1.81	64.56	.45	.9	0
13....	6,200	25	5.83	1.66	64.17	3.33	0	0
14....	7,800	31.81	6.84	1.13	59.65	.56	0	0
15....	8,100	28.88	10.24	.88	55.55	3.11	1.33	0
16....	7,500	25.24	3.93	.56	64.6	5.11	.56	0
17....	6,000	25.26	8.42	.52	63.17	2.1	.52	0
18....	8,800	28.07	3.04	1.21	62.8	4.87	0	0
19....	5,600	33.15	4.57	.57	58.85	2.28	.57	0
	6,100	31.23	1.33	.55	58.33	1.55	0	0
Average	7,470	29.03	6.63	1.12	59.99	2.56	.37	

* From the Clinical Laboratory of St. Agnes Hospital.

JOHN ALBERT KOLMER, M. D.

SUMMARY OF BLOOD EXAMINATIONS.

Date	Leucocytes	Lymphocytes		Transi- tionals	Polymor- phonu- clears	Eosino- philes	Mast Cells.
		Small	Large				
June 8.....							
June 12.....	8 245	27.7	7.95	1.01	58.12	4.9	.22
	7 470	29.03	6.63	1.12	59.99	2.56	.37

Two examinations were made in each case. Due care was exercised in avoiding digestive leucocytosis. Wright's stain was used throughout. In each case two smears were examined in every instance.

One must examine the tables and not the averages to appreciate the blood changes. Examination will show:

1. That a moderate leucocytosis was present in most cases during the acme of the disease.

2. That the eosinophilia was well marked in the larger number of cases at the height of the eruption.

3. Both the leucocytosis and eosinophilia subsided with improvement of the symptoms.

4. That the other leucocytic elements show no particular changes.

The urine was examined on several occasions by Dr. Kolmer. The results are seen in the accompanying table.

URINE EXAMINATIONS.*

JUNE 7, 8, 9, 1909.

NUMBER	COLOR AND SEDIMENT	SPEC. GRAV.	REACTION	ALBUMIN	SUGAR	INDICAN	DIAZO	UREA	MICROSCOPICAL
1.	Yellow and cloudy	1,029	alk.	—	—	—	—		Triple phosphates; bacteria; epithelium; debris.
2.	Brown and cloudy	1,030	alk.	—	—	—	+		Calcium carbonate; amorphous phosphates.
3.	Dark yellow, clear	1,024	alk.	—	—	—	—		Triple phosphates; granular debris.
4.	Yellow and cloudy	1,022	alk.	—	—	—	—		Triple and amorphous phosphates.
5.	Brown and cloudy	1,019	alk.	—	—	—	—		Calcium carbonate; crystalline phosphates.
6.	Pale yellow, cloudy	1,018	neutral	—	—	—	+		Crystalline phosphates.
7.	Pale lemon, cloudy	1,015	alk.	—	—	—	+		No crystals; few epithelial cells and granular material.
8.	Lemon and cloudy	1,020	acid	—	—	—	+	57.34	Negative.
9.	Pale yellow, clear	1,012	acid	—	—	—	—	17.6	Negative.
10.	Amber, cloudy	1,032	alk.	+	—	—	+		Triple phosphates; amorphous deposits; no casts.
11.	Dark amber, cloudy	1,025	acid	+	—	—	—	21.33	Negative; no casts.
12.	Pale lemon, cloudy	1,013	alk.	—	—	—	—		Amorphous phosphates.
13.	Amber, cloudy	1,022	alk.	—	—	—	—		Triple phosphates; bacteria; amorphous deposits.
14.	Yellow, cloudy	1,024	alk.	—	—	—	—		Amorphous phosphates; bacteria; epithelium.
15.	Yellow, clear	1,015	alk.	—	—	—	—	24.78	Negative.
16.	Pale lemon, clear	1,010	alk.	—	—	—	—	30.98	Few epithelial cells.
17.	Amber, clear	1,030	alk.	—	—	—	—		Triple and amorphous phosphates; calcium carbonate.
18.	Yellow, cloudy	1,030	alk.	—	—	—	—		Triple phosphates. [phates.
19.	Amber, clear	1,022	alk.	—	—	—	—		Triple phosphates; calcium phosphates.
20.	Brown, cloudy	1,027	alk.	++	—	—	—		No casts.

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10.	Lemon, cloudy	1,022	alk.	—	—	—	—		No casts; triple phosphates; bacteria.
11.	Amber, clear	1,026	acid	—	—	—	—		Negative.
20.	Light yellow, cloudy	1,025	acid	—	—	—	—		Negative.

*From Clinical Laboratory of St. Agnes Hospital.

JOHN ALBERT KOLMER, M. D.

It will be observed that albuminuria was present in three cases. A more recent contributor to this subject, Dr. Lyman T. Rawles, of Huntertown, Indiana, has also noted albuminuria in several of his patients. This condition is probably analogous with the albuminuria which not infrequently accompanies scabies. Nicholas and Jambon found albumin in the urine sixteen times in one hundred cases of scabies.

MICROSCOPIC EXAMINATION OF LESIONS. A vesico-pustule on an urticarial base was excised for microscopic study. Description of a section stained with polychrome methylene-blue and orange:

Over the region of the vesico-pustule there is seen under low power a circumscribed elevation of the epidermis. The horny layer is represented by merely one or two layers of corneous strands. The stratum granulosum is absent. Two layers of fusiform rete cells with reddish cell bodies and bluish nuclei extend from the lateral portion of the roof of the vesicle towards the middle, but are lost over the central area. No vertical cleavage is present in the centre suggestive of a puncture by a parasite, nor is any parasitic appendage noted anywhere in the skin. Several layers of rete cells with large oval unstained nuclei lying subjacent to the horny stratum fail to take the polychrome stain, but are colored yellow with the orange. Beneath this altered rete is an enormous mass of deeply stained leucocytes with detached Malpighian cells lying in the interspaces. The blood vessels and lymphatic spaces laterally adjacent to the epidermal elevation exhibit a considerable dilatation.

CORIUM. Subjacent to the epidermal vesico-pustule, the corium from the papillary layer to its deepermost portion shows a circumscribed dense cell mass. This is made up chiefly of round cells, but in certain areas there is a considerable admixture of polymorphonuclear leucocytes. In the mid-corium, the latter are seen in large number lying in the lumina of dilated blood vessels and mantling their walls; they are also seen here and there between the collagenous bundles. The exudation can be traced down to a coil of sweat glands. The dilated vessels leading to and from the glands exhibit a large number of round and polymorphonuclear cells in and around them. These cells likewise surround some of the deep-seated sweat coils. Mast cells are present in abundance, particularly in the middle and deeper portions of the corium and more especially in the neighborhood of the blood vessels. They are oval, stellate and fusiform with granules that take the stain well.

Fragmentation of the leucocytic nuclei is present to a limited degree. The histopathological changes are essentially those of an urticarial lesion.

PRODUCTION OF THE CUTANEOUS LESIONS. Unlike the scabies mite, the pediculoides does not burrow into the skin. Microscopic examination of vesicles and pustules has demonstrated the absence of the mite or any part thereof beneath the surface of the skin. The probabilities are that the pediculoides in the process of extracting liquid nourishment from the skin, synchronously injects an irritating substance which gives rise to the lesions.

Upon this phase of the subject, Laboulbene and Megnin, quoted by Moniez, say: "One cannot doubt that this acarus is endowed with a venomous saliva, the inoculation of which is principally the cause of the death of the larvæ and nymph insects on which it lives and multiplies. This saliva is secreted by four pairs of vesicles disposed along the œsophagus and opening into the larynx. The emission of this saliva follows immediately upon the puncture by the mandibles acting as a lancet."

DIAGNOSIS. The affection is apt to be confounded in different cases with one of three diseases—urticaria, chicken-pox, and scabies. I have known many such errors to be made. In one case with a particularly profuse eruption, the patient was under suspicion of suffering from smallpox.

The affection may be distinguished from ordinary "hives" by the longer duration of the individual lesions, by the central vesiculation, the constitutional disturbance, the greater persistence of the attack and the occurrence of the disease among groups of persons.

Chicken-pox, which is at times quite closely simulated by the eruption, may be excluded by the duration of the disease, the smallness of the vesicle, the violence and persistence of the itching and the great incidence of the disease among adults.

Scabies or "itch" may be strongly suggested when the lesions are excoriated by scratching; it may be eliminated from consideration by the freedom of involvement of the hands, by the uniform eruption of erythemato-urticarial lesions surmounted by small vesicles, and by the distribution of the eruption.

Pediculosis corporis could be excluded by studying the character of the individual lesions and by the failure to find the pediculi.

The history of contact with straw is, of course, of great diagnostic value.

TREATMENT. As the pediculoides does not burrow beneath the skin, but merely perambulates upon the surface, it is a comparatively simple task to rid the patient of the parasites. Frequent warm baths with the use of soap would doubtless suffice. I have found the following ointment especially efficacious, as it not only destroys the mites, but also relieves the cutaneous symptoms:

R	Betanaphthol	gr. xxx.
	Sulphur. Præcip.	gr. xl.
	Adipis Benzoat.	ʒi.

In order to prevent reinfection of the patient, his clothing should be disinfected either by boiling or careful sulphur or formaldehyde fumigation. Where the source of the parasites is a straw mattress, the latter may be rendered free of the mites by exposure in a closed chamber to steam, sulphur fumes, or formaldehyde.

Ordinarily, the itching will subside within twelve to thirty-six hours, and the eruption will disappear in a week or ten days. Where, however, the cause is not recognized and the use of the mattress is continued, I have known patients to suffer severely for periods varying from three to seven weeks, when gradual recovery would take place. It would seem, therefore, that the mite dies after a time and permits the patient to get well.

It should be remembered that the disease may be contracted from straw used for other purposes than mattresses. Patients have acquired the disease from straw used for packing purposes, from straw used under carpets, from contact with plants mulched with straw, etc. Sacks of infected wheat, barley, and other grains have likewise given rise to the disease.

NEW DISEASES IN THIS VICINITY. The affection above described was simultaneously observed by various skin specialists of Philadelphia in 1901, and recognized by them at that time as a new disease in this vicinity. While there is evidence to show that this disease is far more prevalent in the United States than was at first thought, yet the clinical picture is unfamiliar to specialists in most of the large cities of this country. At a meeting of the American Dermatological Association held in Philadelphia in June, 1909, I exhibited a patient showing the characteristic eruption of this disease before prominent skin specialists from New York, Boston, Chicago, St. Louis, San Francisco, London, etc. The dermatologists from these localities stated that they had not encountered any cases of the character presented.

Within recent months, however, I have received letters from physicians and laymen residing more particularly in Ohio, Indiana, and Pennsylvania alleging that a disease of this same nature has prevailed from time to time during recent years in their sections. Most of these letters came from towns in Ohio, particularly Zanesville, Columbus, Vincent, Springfield, etc., where the affection is popularly believed to be due to "jiggers." A physician from the last named town writes that in the fall of 1908, during harvest and threshing time, he saw in Washington County some eighty-seven

cases of the disease in question. It affected the harvesters and threshers. This spring he observed thirty-eight cases from contact with straw ticks refilled with straw of last fall's crop. The disease is said to have been more prevalent last year than ever before. Information has come from Columbus, Ohio, that potters who used straw for packing have been so badly attacked at times that the entire force of packers has been off duty. Many times a whole car-load of straw has been so infested that the use of it has been abandoned. In Springfield, Ohio, it is said that the disease was so bad a year or two ago in the lowlands west of this city as to seriously hamper the progress of the construction of a large sewer. In Zanesville, Ohio, the potters have been obliged to abandon the use of straw and employ "prairie hay" for packing purposes.

I am informed by a physician of Pittsburg that a young woman patient has suffered from an affection closely resembling, if not identical, with the one under consideration, each time that she has assisted in emptying cases of dishes packed in straw. Both the physician and the patient had come to believe that something in the straw was the cause of the eruption.

In August, 1909, Dr. Lyman T. Rawles, of Hometown, Ind., published a paper on the "Straw Itch" (*Indiana State Medical Journal*, August, 1909), in which he reported a series of thirty-seven cases of the disease under consideration occurring in eight families under his observation and twenty-four cases occurring in the practice of Dr. H. A. Ray. Dr. Rawles states that the disease first appeared in his section of the country in epidemic form in May, 1909. The people generally attacked were farmers and those living in small villages where straw is used in beds, under carpets and around stables. Horses and cattle have been seen with a disease almost identical with that seen in man.

Dr. Rawles gives an excellent description of the disease from which it is evident that the affection is identical with that observed here in Philadelphia. A mite was found in the straw and likewise certain insect hosts. I had an opportunity of seeing this mite through the courtesy of Professor F. M. Webster, of the Bureau of Entomology, Washington, and it is the same that we have found in our cases.

Dr. W. Kenneth Wills, of Bristol, England, published in the *British Dermatological Journal*, August, 1909, a series of cases

of "barley itch," occurring in some fifteen grain porters who had unloaded a cargo of barley coming from Casa Blanca, West Africa.

The itching began within a half hour of the commencement of the work. A profuse, rose-colored papular eruption of an urticarial nature was present mainly on the chest and abdomen, but also on the neck, face, arms, forearms, shoulders, and a few on the back and legs. The men had had no sleep for several nights on account of the itching.

Dr. Wills, after a painstaking study, came to the conclusion that the urticarial lesions were due to vegetable hairs in the barley dust. Acari were found by one of the experts consulted, but were so macerated that they could not be classified. This was unfortunate, as they doubtless would have been identified as "*Pediculoides*" and their agency in the production of the eruption suspected.

PREVALENCE OF THE AFFECTION ELSEWHERE. Professor F. M. Webster, of the Bureau of Entomology, of the United States Department of Agriculture at Washington, informs me that a letter received by him from a farmer in Centreville, eight miles north of Dayton, Ohio, contains the following information: "About four years ago a parasite was found when threshing wheat out of barns. The eruption consists of hive-like spots with a water-like blister, which changes to pus and then small scabs. Recently baled wheat straw bought by a farmer seemed to be alive with the parasites. They attacked everyone that went into the barn and one of my horses that was perspiring from the effects of a drive was simply covered with little knots or swollen places, and bit and rubbed himself continuously. The farm hands have a great fear and dread of the condition."

In September, 1908, upon unloading a car-load of baled wheat at Pittsburg, a half dozen men and even the horses used in hauling the straw "became suddenly attacked by an irritation that affected both men and animals after the manner of poison ivy." The straw came from Washington Court House, Ohio. The "*Isosoma tritici*" were found in samples of the straw, but no search was made for the *Pediculoides ventricosus*, as the causative relation of this mite was not known to the investigator at that time.

In another letter received by Professor Webster, the writer states that in the neighborhood of Waterloo, Indiana, from July to November, 1908, "a parasite in the wheat was so bad that the people

at threshing time were almost crazy." In the Spring of 1909 people who used straw chaff ticks were "about crazy with the itch, as they called it." The bitten spots "would swell and be inflamed with a yellow spot in the centre which contained either water or yellowish matter." The writer found the *Pediculoides ventricosus* or the joint-worm (*Isosoma tritici*) present.

Three cases of "grain itch" due to sleeping on straw mattresses were recently observed in Baltimore. A number of people in a suburban hotel were also said to have been affected. (From a letter received by Professor Webster of the Bureau of Entomology, Department of Agriculture, Washington, D. C.)

POSSIBLE EXPLANATION OF THE SEASONAL PREVALENCE OF "GRAIN ITCH." As has been previously stated, cases of "grain itch" have been observed to appear in Philadelphia each year since 1901 about the early part of May. The straw which contains the mite is said to have been stored for a considerable time in barns. In view of the life history of the grain moth, it is possible that as the warm weather of May comes on, the grain moth in the straw develops from the larval stage and, acquiring wings, leaves the straw, thus depriving the pediculoides of their nourishment. The famished mites thereupon attack human beings when brought into contact with them.

HISTORY OF THE *PEDICULOIDES VENTRICOSUS* AND ITS ATTACKS UPON MAN. A search of the literature has revealed the information that the *Pediculoides ventricosus* or other allied species has been reported in Europe to have attacked the human subject.

Newport, of England, in 1850, gave the name "*Heteropus ventricosus*" to a mite found on the larva of a wasp. Since this time, the mite has been found on various soft-bodied insects both dead and alive. As the name *heteropus* was preoccupied, Targioni-Tozzetti, in 1875, employed the name "*Pediculoides ventricosus*."

R. Moniez (*Traité de Parasitologie Animale et Végétale, Appliqué à la Médecine*, Paris, 1896), in his admirable book on Animal and Vegetable Parasitology, gives an account of outbreaks of eruptive disorders in which the pediculoides was found. The following material is translated and abstracted from the book of Moniez:

1. Observation of Lagrèze-Fossat (naturalist) and Montané (pharmacist). In 1849, in Espalais (France) a number of men engaged in carrying and handling sacks of wheat experienced immediately thereafter violent itching. The wheat in question was sent to Bordeaux and Moissac, where the same symptoms were produced on

workmen who unloaded the cargo; the men refused to work on account of severe itching which developed immediately on the chest, arms, face, neck and shoulders. Some said the itching was worse than that caused by the "itch." In the majority of workmen, the irritation of the skin was followed by an eruption of papules more or less inflamed, some of which contained serum. The matter was brought to the attention of the Board of Health of Bordeaux. Experts later reported the presence of numerous mites in the wheat. The wheat after being washed and dried in the sun was rendered free of the mites, and the workmen who transported it thereafter remained free of itching.

The mémoire just analysed was accompanied by a drawing of the incriminated parasite. This belongs to the genus *pediculoides*. The writer gave the name "*Acarus tritici*" to the mite. (Lagrèze-Fossat et Montané, "Sur la Mite du Blé." *Registre agronomique de la Société des sciences d'agriculture et belles lettres de Tarn-et-Garone*, 1851, xxxii.)

2. Observation of Robin. In 1867, Robin, in the name of M. Rouyer, communicated to the Société de biologie, the relation of a cutaneous disease observed epidemically in a large number of communes of the department of l'Indre during the previous summer. The peasants engaged in gathering the wheat after the long rains of summer, developed an itching eruption on all exposed parts of the body. The disease began with severe itching which lasted several hours and was followed by reddening of the skin and a miliary eruption covering the surface. The eruption disappeared in three to four days spontaneously or after the use of lotions of vinegar. M. Rouyer saw on the surface of the skin of these patients a great number of small black points which moved. He noted the same on the diseased wheat. Further study showed the presence of the *Acarus* or *Pediculoides tritici*. (Robin, C. R. *Séances et mémoires de la Société de biologie*, 4th series, 1867, iv, p. 178.)

3. Observation published by the *Santé publique*, May 1, 1872. (Extract.) A baker in the canton of Créon received a number of sacks of wheat from Bordeaux. Five men who carried the sacks promptly developed severe itching on the back, shoulders and arms, and then an eruption of somewhat pointed red papules. This eruption during the night became generalized over the body and led to fever, insomnia, agitation and marked thirst. Fear seized the patients and their families, who thought themselves poisoned.

Experts were charged to examine the wheat and determine the cause of the trouble. The *Acarus tritici* was found in the wheat. The journal continues: "It is the wheat-mite, a microscopic insect analogous to the *Acarus scabiei*, which on the human skin, causes the 'itch.' The condition caused by this mite has been called 'grain fever.' Prolonged tub baths cause a disappearance of the itching and of the eruption."

4. Targioni-Tozzetti, in 1875, reported an eruption produced in a laborer who had carried sacks of wheat. A drawing of the parasite accompanied the report. (Targioni-Tozzetti, "Relazione intorno ai lavori della Stazione di Entomologie agraria di Ferenze per l'anno 1876," *Annali dell' Agricoltura*, 1878, i.)

5. In 1879, Geber, (Geber, "Entzündliche Prozesse der Haut durch eine bis jetzt nicht bestimmte Milbe Verursacht;" *Wien. med. Presse*, 1879, et v. Ziemssen's *Handb. spec. Pathol. u. Therapie*, xiv, *Handb. d. Hautkrank.*, 1884, ii, pp. 412), observed in Lower Hungary an eruptive epidemic coming from barley, and due to a small animal parasite. This will be referred to later.

6. Koller's Cases. In July, 1882, thirty-six workmen in Budapest, who were engaged in unloading sacks of barley coming from Kalafat, Roumania, were seized within a half hour by intense itching. The phenomena increased in intensity during the several succeeding days. The neck, chest, arms, abdomen and thighs presented crowded vesicles, the largest of which were millet-seed-sized upon inflamed bases. The patients could not sleep during the following night. Several years previously, the same author had observed a similar malady contracted after unloading sacks of wheat from a boat.

Professor Howath found a mite in the wheat which completely resembled that described by Robin. Several years prior to this, similar observations had been made on the banks of the Theiss and there was no other way of avoiding the trouble but to submerge the boat with its cargo. At the time Koller observed these cases, the same trouble was observed at Cologne with wheat coming from Russia. (Koller, G. "Eine Getreide-Milbe als Krankheitserregerin." Analysed in *Biol. Centralbl.*, 1884, iii, p. 127.)

7. Fleming (Fleming, J. "Ueber eine Geschlechtsreife Form der als *Tarsonemus* beschriebene Thiere," *Zeitschr. f. Naturwissensch.*, 1884, lvii, p. 472, pl. 2), in 1884, published an analogous observation to the above. Workmen in Klausenburg, who unloaded

wheat imported from Russia, were suddenly seized with an eruption similar to the "itch." It was recognized as being caused by the mites which were found by Fleming.

"The following observations have not been reported by the authors who have recently occupied themselves with this question. We give in extenso three interesting analyses which we owe to Berther and which have been written in a review but little known." (Translated from R. Moniez, *Treatise on Parasitology*) [*Journal de Médecine et de Pharmacie de l'Algerie*, xlii, pp. 103, 888.]

CUTANEOUS ERUPTIONS FROM THE DUST OF GRAINS OR CEREALS.

1. "Some time ago," said Professor Layet, "my friend, Dr. Mondot, (D'Oran) communicated to me the observation of several cases of fever with cutaneous eruptions of an erythematous and vesicular character, occupying the exposed surface of the body, namely, the face, neck and hands. The affection developed in persons who had sojourned in a neighboring room to an apartment containing moist barley coming from Silos. In the yard of this habitation our colleague saw several dead chickens and he was told that for a week they had been found this way every day. In the stable a horse was sick and showed on the neck a pustular eruption. The barley had been purchased twelve days before and the chickens and horse had eaten of it at this time. Dr. Mondot sent me a sample of this barley. At first sight I found nothing particular in it, but in placing the grain in a moist, hot, shaded place, I observed the appearance on the grain itself of a whitish dust. I could not determine the nature of this dust which appeared to me to be composed of spores, etc."

2. This observation appears to me to be related to analogous facts already noted in Algeria in 1870. Dr. Nouffert, of Guelma, observed on himself and a member of his family who likewise had descended into a cellar, a series of large, red circles on the arms, the trunk, the neck, and the legs, irregularly circumscribed, hard, slightly rosy plaques of varied diameter, coming on suddenly accompanied by violent itching and insomnia and disappearing towards the seventh or eighth day. This phenomenon developed as a result of the descent into the cellar where there were stored twenty sacks of barley of good quality. Our confrere observed them to be covered with a reddish dust. The microscope demonstrated this dust to be

exclusively formed of animalcules of great vivacity. Dr. Nouffert gave the name of "*Acarus urticans*" to this insect. The best means to destroy these parasites was boiling salt water sprinkled over them with a watering can. Since this time our distinguished confrere has had occasion in several instances to observe the same accidents among Europeans and natives. (*Bull. Soc. d. sc. d'Alger.*, 1875, 1st trimester.)

3. In 1881, Dr. Collard, physician of Gouraya, on coming into a room containing a quantity of barley intended for a mule, experienced on the legs a burning and itching, and found them covered with a redness in certain areas on which there developed isolated vesicles. There was a complete disappearance of the lesions after painting them with strong carbolic acid. A neighboring lady had the same trouble. The mule was seized with cough and dyspnoea. Examination of the grain showed the presence of an acarus.

GEBER'S OBSERVATIONS. Professor Geber, of Klausenburg, published an article in the *Wiener medizinische Presse*, 1879, page 1362, on "An Inflammatory Process of the Skin Produced by Hitherto Undetermined Species of Mites." In the early days of June, a cargo of barley was received in sacks from Lower Hungary. Those unloading the cargo were seized a few minutes afterwards with a violent itching and burning to such an extent that they were with difficulty persuaded to continue the work. Powder obtained from shaking the barley was examined with the naked eye and under a magnifying glass without disclosing anything, but under the microscope, it was found to be almost exclusively made up of dead and living minute animals and their rudiments.

The living animals were of a long oval form, of yellowish-white color, and averaged 0.022 in length. They could only be seen with the naked eye when they were moving. Geber thoroughly described the parasite in detail and published drawings of the male and female; believing the mite to be hitherto undescribed, he gave it the name "*Chrithoptes monunguiculosus*," indicating a one-clawed barley larva.

Geber used the infected barley powder on certain patients and noted eruptions of several grades of intensity. The simplest consisted of an outbreak of urticaria. Over a large area of surface were wheals either discrete, or confluent, in plaques reaching the size of the palm of the hand. There was a tendency to localization about the mouths of the follicles. After the subsidence of the first

stormy outbreak, there remained lentil-seed-sized nodules (lichen urticatus of Hebra) covered with blood crusts. If the epidermis in the neighborhood of the follicles was carefully lifted off, the parasite could nearly always be found.

In severe cases, pin-head-sized papules, pustules and vesicles are present with urticarial lesions and an eczematous process. After about twenty-four hours, the wheals disappear and the eczema increases in intensity. In extensive eruptions, the itching is violent night and day, and there is anorexia and often a mild febrile movement for a day or two. The whole process usually lasts about five or six days.

In the severest grade of the eruption, there develops a pronounced dermatitis. The process is more rapid and the acme of the eruption is reached on the third or fourth day. The skin in small or large areas becomes vivid red, sensitive and its temperature is distinctly raised. The surface is so tender that contact with the clothing or bed linen causes actual pain. The patients are restless, complain of burning pain, have great thirst and a temperature often of 38.5° C. After remaining stationary for a day or two longer, the eruption gradually disappears, followed by peeling and some pigmentation (Geber).

REFERENCE TO AN ERUPTIVE AFFECTION DUE TO CONTACT WITH STRAW BEDS IN MASSACHUSETTS IN 1831. Professor F. M. Webster, of the Bureau of Entomology, United States Department of Agriculture, has called my attention to the following reference which indicates that contact with straw beds occasioned a skin eruption three-quarters of a century ago in this country. It is possible that a mite similar to or identical with the one found by us may have been responsible. The following extracts are culled from *The Report of Insects Injurious to Vegetation*, by Thaddeus William Harris, M. D., Boston, Mass., edition of 1852.

“ . . . In the years 1829 and 1830 several communications were published in the eighth volume of Fessenden's ‘New England Farmer’ respecting a disease of barley-straw, produced by the punctures of insects. . . . (page 437). Most of the stalks were found to have a number of small worms within them, near to the second joint and had become hardened in the part attacked, from the interruption of the circulation of the sap. . . . The worms or maggots were found by John M. Gourgas, Esq., of Weston, Mass., to be transformed to small flies, about the make and size of a small black ant, with wings, which were thought by some persons,

to be the same as the Hessian flies. In the summer of 1831, myriads of these flies were found alive in straw beds in Gloucester; the straw having been taken from the fields the year before. An opinion at that time prevailed, *that the troublesome humors, wherewith many persons were then afflicted, were occasioned by the bites of these flies; and it is stated that the straw beds in Lexington, being found to be infested with the same insects, were generally burnt* " (page 438).

"About eight years ago, some of these insects, that had come from a straw bed in Cambridge were shown to me. *They had proved very troublesome to children sleeping on the bed; their bites or stings being followed by considerable inflammation and irritation which lasted several days.* So numerous were the insects that it was found necessary to empty the bed-tick and burn the straw. Since that time, I have heard nothing more either of the insects or of the disease of barley-straw in this part of the country " (page 440).

CHARACTERISTICS OF THE *PEDICULOIDES VENTRICOSUS*. In the book on Acarina or Mites, by Nathan Banks (1904), the pediculoides are classified as follows:

Class—Arachnida.

Order—Acarina or mites.

Superfamily—Sarcoptoidea.

Family—Tarsonemidæ.

Genus—Pediculoides.

The tarsonemidæ constitute a small family, but one of much biologic and economic importance.

The mouth parts are formed for sucking and the mandibles are needle-like. The abdomen of the pregnant female, which is at the nether end, swells enormously so that it is twenty to one hundred times the size of the rest of the mite. The eggs hatch out and pursue their entire development in the mother and are born as sexually mature mites.

The character of the pediculoides has been definitely fixed by Canestrini. According to Moniez, the pediculoides is characterized as follows:

(1). Normal and free rostrum. Legs of the fourth pair in the female, of the same dimensions, as the others, terminated by two nails and a sucker; legs of the first pair, in the female, normal, terminated by a claw; legs of the fourth pair in the male, little different in dimensions from the others, terminated by a claw. Dorsal plaque

segmented. Abdomen of the gravid female swells up into a sort of sphere.

The last anatomic characteristic is the most striking of the genus. The female is ovoviviparous and gives birth to small octopods which can be fecundated immediately. It is possible that the pediculoides parasites upon man do not belong to a single species.

AGRICULTURAL IMPORTANCE OF THE PEDICULOIDES. As has been stated the pediculoides ventricosus is parasitic upon the larvæ of soft-bodied insects. This species of mite acquires considerable economic importance owing to the fact that the insect hosts are usually grain destroying parasites. The mite is inimical to the grain insects and therefore favorable to the preservation of the grain.

It will be recalled that Newport first found pediculoides ventricosus upon the larvæ of a wasp. Professor Herrera of Mexico has made the effort to breed a Mexican species of the mite to kill the grubs of the cotton boll weevil.

While pediculoides is rather indiscriminate concerning its prey, it has been chiefly found in this country upon the isosoma grande (wheat-straw worm), the closely allied species, *Isosoma tritici* (joint worm), and the *Sitotroga cerealella* or Angoumois grain moth.

The wheat-straw worm is largely found in the wheat-growing sections west of the Mississippi River, while the joint worm is the chief enemy of wheat east of this waterway. These insects, when they prevail in great abundance, may cause great damage to the wheat crop. They may be roughly compared in appearance to "minute or large, shining black ants, with or without wings, their legs more or less bounded with yellow and having red eyes" (Webster). The isosoma passes the winter in the larval or pupal stage and reaches maturity early in April (Reeves).

According to Webster and Reeves ("The Wheat-Straw Worm," by F. M. Webster and Geo. I. Reeves: United States Department of Agriculture, Circular No. 106, 1909), in the extreme northwest United States, "Injury to wheat by the straw worm is induced by growing crops of winter wheat repeatedly upon the same ground; by leaving volunteer plants among the spring wheat, even at a distance from the wheat fields, and by growing spring wheat near winter wheat. . . . The remedy lies in avoiding these conditions by rotation of crops, clean early summer fallowing and the abandonment of spring wheat culture."

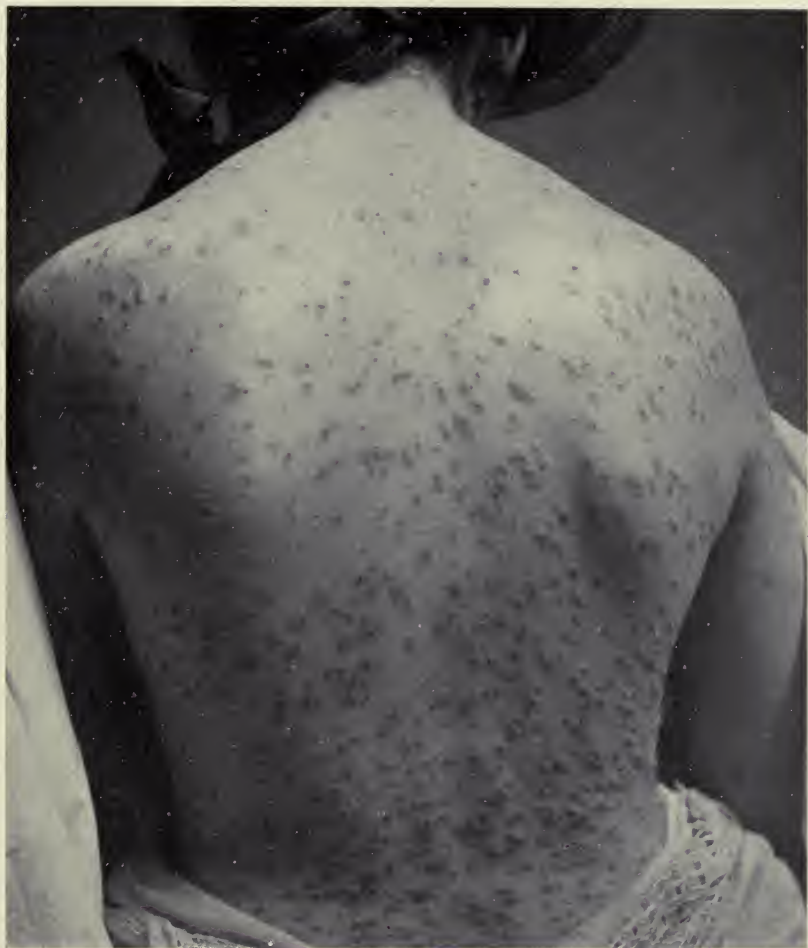


FIG. 1.

Urticaria-vesiculo-pustulosa Type.



FIG. 2.

Urticaria-vesiculo-pustulosa Type.



FIG. 3.
Erythema Multiforme Type.



FIG. 4.
Variceloid Type.



FIG. 5.

Microscopic section of a vesico-pustule upon an urticarial base. Exhibits dense cell mass made up of lymphocytes and polymorphonuclear leucocytes in the epidermis and in the corium.



FIG. 6.

Microscopic mite belonging to the genus *Pediculoides*, found in the straw of mattresses. Female mite; magnified about 300 diameters.



FIG. 7.

Adult of *Isosoma*. *Tritici* or joint-worm. (Greatly magnified.)

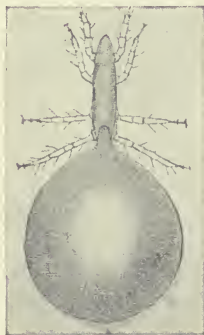


FIG. 8.

Pediculoides ventricosus: Pregnant female.



FIG. 9.

Schematic drawing of the *Pediculoides ventricosus*. (After Geber.)

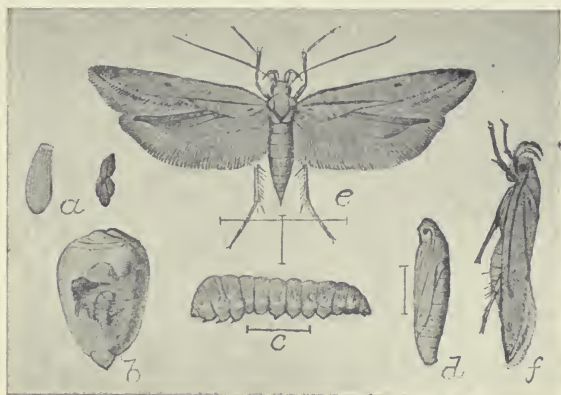


FIG. 10.

Grain moth (*Sitotroga cerealla*).

a, eggs; *b*, larva at work; *c*, larva, side view; *d*, pupa;
e, moth; *f*, same, side view.



FIG. 11.

“*Pediculoides*” and *Pediculus pubis* compared in size. Each magnified about 75 diameters.

a, *Pediculoides ventricosus*; *b*, *Pediculus pubis*.

THE ANGOUMOIS GRAIN MOTIL. "This moth received its name from the province of Angoumois, France, where it is known to have been injurious since the year 1736. From the seat of its supposed introduction in North Carolina and Virginia, this moth has spread to neighboring states in the South, where it does incalculable damage, and to the southern portions of the Northern States, where it is less injurious. Although not so widely distributed as the true grain weevils, it is rapidly increasing in range, and as it attacks grain in the field, even as far north as central Pennsylvania, as well as in the bin, is even a more serious pest in the localities in which it has become established than the weevils. It infests all the cereals, as well as buckwheat and the chick-pea, products of the tropics. It has been estimated that in six months, grain infested by this moth loses forty per cent. in weight and seventy-five per cent. of farinaceous matter."

"The adult insect resembles somewhat a clothes moth, for which, indeed, it is often mistaken. It is light, grayish-brown in color, more or less lined and spotted with black, and measures across the expanded fore-wings about half an inch. The hind-wings are bordered with a long, delicate fringe."

"The moth deposits its eggs in standing grain and in the bin, singly and in clusters of from twenty to thirty. The eggs are white when first laid, but soon turn red and hatch in from four to seven or more days, when the minute larvæ or caterpillars burrow into the kernels and feed on the starchy interior. A single larva inhabits a grain of the smaller cereals, but maize affords sustenance for two or more individuals."

"In three weeks or more, according to season, the caterpillar attains maturity, when it spins within the kernels a thin, silken cocoon and transforms to a pupa or chrysalis, the moth emerging a few days later, the entire period from egg to adult embracing in summer time about five weeks and in colder weather considerably longer" (F. H. Chittenden, Assistant Entomologist, United States Department of Agriculture, Farmer's Bulletin, No. 45, 1896).

Webster, of the Department of Agriculture, after examining our incriminated mattresses, was of the opinion that the insect host of the pediculoides in the straw was not the isosoma, but the *Sitotroga cerealella* or grain moth. In a letter received from him, he writes: "In going over the Bureau Correspondence since 1900, I find that in a great number of cases, the occurrence of this

grain-infesting insect has been reported from the vicinity of Philadelphia"; and again, "The grain moth has been distinctly more prevalent in the Eastern States since 1901."

It will be recalled that the eruptive diseases caused by the pediculoides has been observed in Philadelphia only since 1901.

Whether or not the pediculoides invariably requires for its subsistence an animal host is not definitely known. Moniez believes that the mite is primarily parasitic upon grain and only secondarily upon insects.

He says: "It appears certain that the pediculoides can only undergo evolution if they have at their disposition a liquid nourishment; they must attach themselves either upon some vegetable, or in default of this, on some animal. In the case of wheat, they develop upon the larvæ of insects that live at the expense of the grain. When the nymphs are famished, they will throw themselves upon workmen carrying wheat and attack the skin.

"Amerling, in Bohemia, did not find the mites in company with parasitic insects; they can live on the grain.

"When the cereals become dry, the mites attack animal life. They are forced to quit the vegetable kingdom for the animal. In this respect they act as do the ixodes."

Webster, however, feels skeptical as to the ability of this particular pediculoides to sustain itself on grain. "I am still very doubtful about this mite being able to sustain itself on grain or any other vegetation. Very soon after the adult female begins to feed, it becomes so large and clumsy as to be absolutely helpless, and could not by any possibility inhabit the head of unripe grain."

"GRAIN ITCH" OR ACARO-DERMATITIS URTICARIOIDES. It is desirable that some appropriate name be applied to the disease above-described. In newspaper and journal articles it has been referred to as "barley itch," "straw disease," "mattress disease," etc. Inasmuch as the mite may inhabit most any of the cereals, a correct and convenient popular appellation would be "grain itch." As the affection is a dermatitis with hive-like lesions resulting from the invasion of the skin by an acarus, I would suggest the scientific name "acaro-dermatitis urticarioides."

Judging from the increasing prevalence of this affection during the past few years, it is not improbable that it will in the future be encountered more frequently and over more widely extended territory.

RECAPITULATION AND CONCLUSIONS.

1. An eruptive disorder, new to the physicians of this country, has, since 1901, been appearing in the vicinity of Philadelphia, and within recent years also in Indiana, Ohio, and other states.

2. The disease is characterized by a wide-spread urticarioid eruption accompanied by intense itching and commonly by mild fever and other systemic symptoms.

3. The characteristic cutaneous lesion is a wheal surmounted by a minute vesicle which rapidly becomes pustular.

4. Nearly all of the patients exhibit a slight leucocytosis and a moderate eosinophilia, and a certain proportion have albumin in the urine.

5. Microscopic examination of the cutaneous lesions demonstrates that the mite does not burrow into the skin as does the acarus of scabies. The pathological changes in the skin are characteristic of the lesions of urticaria.

6. The disease is due to contact with cereals or straw infested with the *Pediculoides ventricosus* or an allied species of mite.

7. Straw mattresses appear to give rise to the most severe and most persistent dermatitis for obvious reasons. Straw used for packing purposes, and sacks of wheat, barley, and other grains constitute additional sources of infection.

8. The *Pediculoides ventricosus* has always been found associated with and predatory upon other insects, particularly grain-destroying insects.

9. The *Pediculoides ventricosus* has an economic and agricultural importance because it tends to protect the grain crops by destroying the larvæ of the wheat-straw worm, the joint worm, and the grain moth.

10. Wherever "grain itch" is prevalent, it will probably be found that grain-destroying insects abound.

11. An identical or similar affection from contact with sacks of barley and wheat was noted by naturalists many years ago in France, Germany, Russia, and certain other European countries.

12. "Grain itch" is readily cured if the sufferer can avoid the source of infection.

FOOT NOTE. At the moment of going to press there appears in the *Monatsshefte für praktische Dermatologie*, Band 50, No. 1, January 1910, page 26. a brief reference to two articles on epidemic dermatitis due to the *Pediculoides ventricosus* in wheat, by A. Ducrey and by Sberna, read at the tenth meeting of the Italian Dermatological Association, held in Rome, December 1908.

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